UREA FROM WILGIE MIA CAVE, W.A., AND A NOTE ON THE TYPE LOCALITY OF UREA

By P. J. BRIDGE, Government Chemical Laboratories, Perth

Urea, an organic mineral derived from mammalian urine, is rapidly decomposed under humid and bacterial conditions. However in dry warm areas accumulations of crystalline urea and associated minerals may occur. Several occurrences of urea are known, one from Egypt and the other from Lake Rason, W.A. (Bridge, 1973a).

A further occurrence is in Wilgie Mia Cave (26° 56'S, 117° 41'E) which is developed in a hematite-rich zone of the banded ironstone of the Weld Range. The mining of red ochre over a long period of time by Aborigines and later commercial ochre production has enlarged the cave (Ellis, 1952).

In 1973 M. Thomas, while investigating physiological aspects of the bat *Taphozous georgianus* which occurs with *Eptesicus pumilus* in Wilgie Mia Cave, collected an encrustation of urea and biphosphammite from the hematite wall rock of a small side chamber in the upper part of the cave. Further specimens were collected by the writer in late 1973. The urea occurred in a stalagmitic form approx. 30 cm high on a steep slope. The outer surface of the stalagmite was coated with hematite dust. The crystal mass is friable, cavernous, pale yellow in colour and contains scats composed of mammal hair, bone fragments and insects. The position of the

Fig. 1.—Urea Stalagmite (the capsule is 4.5 cm high).

stalagmite and its constituents can only be attributed to bats, confirmed as the Ghost Bat, *Macroderma gigas*, by A. M. Douglas from examination of scats. Feathers, mainly from owls, *Tyto sp.* or *Ninox sp.*, are cemented into the crystal mass. Minerals associated with the urea were aphthitalite $(K,Na)_3Na(SO_4)_2$ and biphosphammite $(NH_4H_2PO_4)$.

The similarity of the Wilgie Mia and Lake Rason samples suggests that the latter occurrence may also be derived from *Macroderma,* thus extending the possible known range of this bat. Further the possible difference in the mineralogy and chemistry of *Macroderma* and insectivorous bat guanos, shown by the high K_2O content of the latter (Bridge, 1973b) strongly indicates a *Macroderma* origin for the Lake Rason guano.

When Bridge (1973a) was published no information on the location of Earles Find could be found. The diaries of F. Hann, now in the Battye Library, Perth, have enabled the locality to be fixed at 129° 18'E, 26° 10'S, in South Australia near the WA-SA-NT border. The locality was visited by Hann on May 28 and 29, 1906 where he reports: "I came on a strange hill just as it was getting dark, got off, saw it was a kind of ironstone, I looked about and saw the hole in the side Earles spoke of. I am sure now I have Earles Find . . . . at the east end it is about 50 feet high, nearly all iron, cave on N side, east end, small hole to go in about 20 feet, can stand up in it." Hann visited Earles Find again on January 15-18, 1907.

His diary makes no mention of bats or having collected any guano samples on either trip to Earles Find. However he reports from a place he named Bats Camp "a good cave here, dozens of bats in it." This was visited on January 18, 1906 and is in the vicinity of Lake McInnes which is approximately 124° 10'E, 28° 22'S. This is some 25 miles NE of Toppin Hill which was considered the urea type locality (Bridge, 1973a).

The problem arising as to the correct type locality for the mineral urea will not be resolved until an examination is made of the possible sites.

Pseudobitumen or dung bitumen, derived from rat droppings and incorporating large amounts of hematite is common on ledges around the entrance to the side chamber containing the urea in Wilgie Mia Cave. An analysis of this material reported by Maitland (1905) showed a high content of K_2O and examination by the author of the water soluble inorganic compounds showed sylvite (KCl) to be the main component with minor syngenite ($K_2Ca(SO_4)_2 . H_2O$), nitre (KNO_3) and aphthitalite. Specimens are preserved in the collections of the W.A. Government Chemical Laboratories, W.A. Museum and British Museum (Natural History).

The author appreciates the co-operation of A. Baynes, R. E. Johnstone and A. M. Douglas of the W.A. Museum and of M. Thomas for supplying the original sample. The help of the South Australian Department of Mines and the State Library of South Australia in supplying old references is also appreciated.

REFERENCES

BRIDGE, P. J., 1973a. Urea, a new mineral and neotype phosphammite from Western Australia. *Min. Mag.,* 39: 346-348.

BRIDGE, P. J., 1973b. Guano minerals from Murra-el-elevyn Cave, Western Australia. *Min. Mag.,* 39: 467-9.

DOUGLAS, A. M., 1967. The natural history of the Ghost Bat, *Macroderma gigas* (Microchiroptera, Megadermatidae) in Western Australia. *West. Aust. Nat.,* 10 (6): 125-138.

ELLIS, H. A., 1952. Report on radioactivity at Wilgi [sic] Mia Cave, Mineral Claim 26. *Ann. Prog. Rpt. Geol. Surv. W.A. for 1952:* 44-48.

MAITLAND, A. Gibb, 1905. Miscellaneous mineral notes. *Ann. Prog. Rpt. Geol. Surv. W.A. for 1905:* 21.